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## SUPPLY OF NATURAL FORAGE *Bidens pilosa* (CADILLO) PLUS MAIZE CHALA (*Zea mays*) IN THE RATIONING AND WEIGHT INCREASE IN IMPROVED *CAVIA* *PORCELLUS* IN HUAURA-LIMA 2023

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**Abstract: Objective:** To evaluate the effect of the supply of forage cadillo (*Bidens pilosa*) and chala de maíz (*zea maíz*) on weight gain (muscle mass) in guinea pigs (*Cavia porcellus*). In growth and finishing. **Methods:** The research was carried out at the facilities of the Universidad Nacional José Faustino Sánchez Carrión de Huacho, Huaura Province, in the year 2023. The forage feed was fed ad libitum to the animals. We worked with a sample of 40 male guinea pigs from 30 to 90 days of age, randomly distributed, with 10 guinea pigs for the control group (control treatment TC), fed with alfalfa (*Medicago sativa*) as conventional diet, and 30 guinea pigs for the experimental treatment, distributed in three homogeneous groups as repetitions (TE-R1; TE-R2; TE-R3), fed with natural fodder combined with corn stover. **Results:** The guinea pigs of the control group reached a final weight of 1034 g., and the experimental group reached a final weight of 1022 g., with the control group showing an average total weight increase of 12 grams more than the guinea pigs of the experimental group in 60 days of the experiment, which constitutes a significant difference between the control treatment (CT) and the experimental treatment (ET), and reflects that both rations produce a relevant weight increase. **Conclusions:** Feeding alfalfa generates good weight gain in guinea pigs due to the nutritional richness of this forage, but its cultivation requires high production costs; on the other hand, the use of natural cadillo forage in the ration is of zero cost and associated with corn husk produces a weight gain similar to that obtained with the use of alfalfa; which indicates an alternative to reduce production costs in guinea pigs.

**Keywords:** guinea pig feeding, cadillo, corn husk.

## INTRODUCTION

The domestic species *cavia porcellus*, called guinea pig, is an animal that produces lean meat with high protein value (20.3%). The conventional feeding of guinea pigs is based on balanced feed (concentrate) and cultivated forage - alfalfa, which requires a high maintenance cost. Fresh forage in the ration is necessary because it provides the vitamin C that this species needs, and also because the guinea pig has the capacity to degrade up to 18% of fiber.

To increase weight and in order to reduce production costs, natural forage, called *Bidens pilosa*, also known as “cadillo”, and corn husk, was used to feed guinea pigs. Cadillo, a natural forage, is considered a “weed”, since it appears and grows naturally on any geographical level, so its cultivation is of zero cost; and it is also considered an alternative for feeding and weight increase in the guinea pig, and thus reduce food costs, since the price of food inputs for the production of balanced feed (concentrate) is relatively high.

Likewise, chala corn forage was used to feed guinea pigs, in order to observe its forage potential in the nutrition of these livestock, this type of “food” is considered as an alternative to complement the feeding of guinea pigs.

According to phenotypic and genotypic antecedents, it is known that the creole guinea pigs existing in the Andean countries are characterized by being small and their muscular development is scarce. The head is triangular, elongated and angular. They are nervous and are not well adapted to living in pools, and because of the height of their jumps, they are difficult to handle. Within the classification by body conformation, they correspond to type B guinea pigs. There are guinea pigs of all types, with a predominance of 1 (60.65 percent) and 2 (33.32 percent). These are different from the improved guinea pigs that are the product of genetic improvement (rmr\_peru@yahoo.es).

Animals must be selected and maintained under optimal environmental conditions so that they can express their genetic potential to the maximum (Hammond, 1947, cited by Wagner and Manning, 1976 and by Lilia Chauca de Zaldívar, 1997). Of course, this theory implied that the animal would continue to express its superiority in an inferior environment, a contradiction that was commented by Falconer and Latyszewski in 1952 (cited by Preston and Willis, 1975, and by Lilia Chauca de Zaldívar). Both pointed out that, if the animal did not show its superiority in a poor environment, it could not express it for production purposes either, resulting of little benefit for selection.

Peru began guinea pig breeding work in 1966, with the evaluation of germplasm from different ecotypes sampled at the national level. In 1970, at INIA's La Molina Agricultural Experimental Station, a selection program was initiated with a view to improving the existing guinea pig at the national level. Animals were selected for their precocity and prolificacy, and the Peru, Inti and Andean lines were created. Considering the phenotypic and genotypic factors of guinea pigs, and that generate benefits to farmers, it is referred to select the types: 1, 2 and A, in merit to the coat and body conformation, respectively.

The so-called chipaca, masiquía or cadillo, *Bidens pilosa*, is a species of plant belonging to the Asteraceae family, native to South America and has a cosmopolitan distribution, it is considered a weed in some tropical habitats; however, in many parts of the world it is a source of animal feed, Ronny Chiclla (2017) mentions that cadillo contains 14.8 protein, 9.85 ash, 14.18 fiber. In addition, it is known that cadillo contains important medicinal properties mentioned by Wilson Perez (2017); in traditional Chinese medicine it is indicated as choleric, anti-ulcer, anti-fungal, anti-bacterial.

Corn stover is a forage of good palatability and of high use in the feeding of different animal species, mainly in dairy cattle; thus, according to Montero, et al, 1999, mentioned by Almeyda, M. (2013) the nutritional value of corn stover in the fresh state presents stalks as more lignified structures and lower crude protein content (3.1%) and leaves between 4 and 7%; stalks plus leaves: 4.2% of crude protein (Montero et al. 1999).

The objective of the research work is to determine the contribution of the combination of natural forage - cadillo and corn husk, in the feed ration and the consequent carcass (meat) gain of growing and finishing guinea pigs.

## MATERIAL AND METHODS

### LOCATION

The research was carried out at the Universidad Nacional José Faustino Sánchez Carrión in Huacho, Province of Huaura.

### POPULATION AND SAMPLE

**The guinea pig population** consists of livestock raised in the Huaura valley.

**The sample** consisted of 40 growing-finishing male guinea pigs, distributed in homogeneous groups, considering a control group - control of 10 guinea pigs with conventional alfalfa-based feed, and 30 guinea pigs fed with natural grass called cadillo plus corn husk, distributed in 03 experimental groups as replicates, with 10 guinea pigs per group under the randomized experimental design (R.E.D.).

### FACILITIES

The shed is built of bricks and roofed with local materials, in which existing cages (wood and metal) were used, distributed as follows:

- 03 rearing cages for males, 1 m. per side by 0.70 m. high.

- 03 breeding cages for females, 1 m. per side by 0.70 m. height.
- 03 individual cages for guinea pigs under observation (with health problems) of 1 meter by 0.70 m. high.

## METHODOLOGY

The method used was inductive - deductive, experimental. The feed was supplied ad libitum. The control group - control with 10 guinea pigs was fed with alfalfa, and the guinea pigs in experimentation distributed in 3 groups of 10 animals each were fed with natural fodder - silage combined with corn husk, for a period of 60 days.



Figure 1: Feeding with corn stover and corn husk

NUTRIENT	%
Total protein	18 - 20
N.D.T.	56 -60
Fiber	9 - 18
Grease	1.0
Calcium	1.2
Potassium	1.4
Phosphorus	0.6

Table 1. Nutritional requirements of the guinea pig (Leonard, 1992)

## RESULTS

The results of the research show that the supply of natural forage *Bidens pilosa*, also called cadillo, in combination with corn husk in the diet of guinea pigs (*Cavia porcellus*) in experimentation (TE) allowed reaching a lower average weight in this species (1022 g) compared to the control group - control (TC) that reached a higher average weight (1034 g), whose animals were fed only with alfalfa; which means an average weight increase of 12 grams in favor of the control group; this implies a significant difference between both treatments; and is detailed below: **Table 2, 3 and 4**; Figure 2.

Treatments	Average weight gain		Difference in weight gain
Control	1034	1034	12 g.
TE-R1	1014	1022	
TE-R2	1028		
TE-R3	1024		

Table 3: Final weight gain per treatment (g)

Treatments	Average weight gain
Control	153
TE-R1	144
TE-R2	135
TE-R3	140

Table 4: Average weight gain per treatment (g).

## HYPOTHESIS TESTING

### • HYPOTHESIS FORMULATION

$H_0 : \mu_T = \mu_C$  THERE IS NO SIGNIFICANT DIFFERENCE BETWEEN TREATMENT AND CONTROL.

$H_1 : \mu_T \neq \mu_C$  IF THERE IS A SIGNIFICANT DIFFERENCE BETWEEN TREATMENT AND CONTROL.

### • LEVEL OF SIGNIFICANCE

$$\alpha = 0,05$$

		Guinea pigs Finished growth (30 - 90 days)		INCREASE IN WEIGHT (g)		
		Evaluation day	Average Weight Gain (g)	Final Weight Treatments	Average Weight	Average Total 60 days experiment
CONTROL GROUP (TC)		30	126	1034	153	1034
		45	180			
		60	89			
		75	231			
		90	141			
TREATMENT EXPERIMENTAL (TE)	TE -R1	30	108	1014	144	1022
		45	147			
		60	276			
		75	137			
		90	53			
	TE- R2	30	134	1028	135	
		45	210			
		60	116			
		75	153			
		90	64			
	TE-R3	30	169	1024	140	
		45	102			
		60	266			
		75	98			
		90	64			
Difference in final live weight gain (g), control treatment:						12g.

Table 2: Weight gain in guinea pigs fed alfalfa. Control group - Control (CT), and guinea pigs fed with *Bidens pilosa* (Cadillo) plus corn stover (T.E).

## Weight

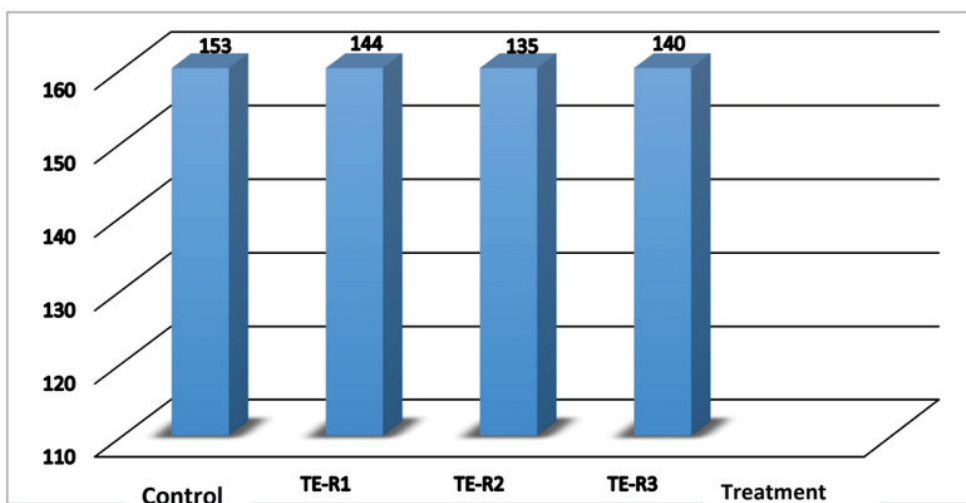


Figure 2: Average live weight increase by treatment

- **TEST STATISTICIAN**

$$T_{calc} = \frac{(\bar{X}_T - \bar{X}_C) - 0}{\sqrt{\frac{S_P^2}{n_1} + \frac{S_P^2}{n_2}}} = 5,24$$

where:

$$S_P^2 = \frac{(n_T - 1)S_T^2 + (n_C - 1)S_C^2}{n_T + n_C - 2}$$

- **T OF TWO SAMPLES FOR EXPERIMENTAL TREATMENT vs. CONTROL**

Error  
standard  
of the

N Mean Mean st. dev.

TREATMENT. 30 201.3 62.3 11

CONTROL 10 91.9 36.2 11

Difference = mu (TREATMENT.) - mu (CONTROL)

Estimated variance: 109.4

95% CI for the difference: (67.1; 151.7)

T-test for difference = 0 (vs. not =): T-value = 5.24

P-value = 0.000 GL = 38

Both use Pooled Standard Deviation = 57.2049

- **INTERPRETATION**

Since the p-value = 0.000 < 0.01, it can be affirmed at a significance level of 0.01 that there is sufficient statistical evidence to affirm that there is a significant difference between the treatment under study and the control; therefore, it is concluded that the supply of natural forage (*Bidens pilosa*) plus corn stover (*zea mays*) in the ration influences weight gain in guinea pigs.

## DISCUSSION

The forage *Bidens pilosa*, also called *cadillo* is of natural growth and considered as a weed harmful to other crops, according to Ronny Chiclla (2018) mentions that *cadillo* contains 14.8 protein, 9.85 ash, 14.18 fiber, and when fresh it provides vitamin C; which is reflected in the carcass gain (meat) in growing and finishing guinea pigs in our research.

*Cadillo* is highly palatable for different animal species, and this forage is very nutritious and in traditional Chinese medicine it is attributed medicinal properties, such as: choleric, anti-ulcer, anti-fungal, anti-bacterial, which contributed to the prevention of diseases in the cattle in our study that consumed this food.

The corn husk is a conventional forage and widely used in animal feed, due to its nutritional contribution and high palatability for consumption, as indicated by Almeyda, M. (2013), which agrees with our research.

As in Table 2 of the research, the control group of our study achieved a final average live weight of 1034 grams at 90 days of age, reaching a weight increase of 12 grams in favor of the control treatment in 60 days of the experiment compared to the experimental group, which achieved a final average live weight of 1022 grams.

Consequently, *cadillo* should be used as guinea pig feed, with the added benefit of preventing and controlling diseases.

## CONCLUSION

The results support that it is pertinent to feed guinea pigs with the combination of natural forage *cadillo* plus corn husk, since it allows reducing feeding costs, improving yield and meat quality; it also produces a weight increase similar to that generated by alfalfa, increasing the meat production of this species and the profitability of guinea pig breeders.



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